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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/050,334	01/15/2002	Vishnu K. Agarwal	MI22-1913	7861

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WELLS ST. JOHN P.S.
601 W. FIRST AVENUE, SUITE 1300
SPOKANE, WA 99201

EXAMINER	
NGUYEN, TUAN H	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/050,334	AGARWAL ET AL.	
	Examiner	Art Unit	
	Tuan H. Nguyen	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-24,26,28 and 29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-24, 26, 28, 29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 8-18-06
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 22-24, 28, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chi in view of Schugraf et al. (cited refs.).

Chi, fig. 4 and related text on col. 2-3 discloses substantially the claimed capacitor construction including an opening 113 in an insulative layer over a substrate 101; an oxidized HSG polysilicon layer 203 over the sides of the opening but not over the bottom wherein the polysilicon comprises spaced apart grains (fig. 2, col 2, line 41 to col. 3, line 12); a conformal first capacitor electrode 301 of doped polysilicon on the oxidized HSG polysilicon 203 but not comprising the oxidized HSG polysilicon 203 as part of the first electrode, the first electrode 301 being sufficiently thin that the first electrode has a rugged outer surface with an outer surface area per unit area greater than an outer surface area per unit area of the substrate underlying the first electrode (col. 3, third and fourth paragraphs); a capacitor dielectric layer 401 on the first electrode 301; and a second electrode 403 over the dielectric layer 401.

Chi fails to teach a conformal first capacitor electrode of TiN on a HSG polysilicon for increasing surface area that in turn, increases capacitance.

Schugraf et al. in a related electrode structure for use on an integrated circuit as shown in figs. 4-5 and text on col. 4, teaches the use of either doped polysilicon or TiN for first capacitor electrode 30 on HSG 20b (col. 3, last paragraph to col. 4, fourth paragraph); .

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have replaced polysilicon with TiN, and oxidized HSG with unoxidized HSG in capacitor structure from Chi as suggested by Schugraf et al., since the use of either oxidized or unoxidized HSG for increasing surface area of the capacitor electrode is known by those skilled in the art, and the substitution of art recognized equivalence as suggested by Schugraf et al. is within level of those skilled in the art.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chi in view of Schugraf et al. as applied to claims 22-24 above, and further in view of Hwang et al. (cited ref.).

The combination of Chi and Schugraf et al. fails to teach dielectric layer comprises high dielectric constant material.

Hwang et al. in a related capacitor structure teaches the use of high k material including Ta_2O_5, Al_2O_3, HfO_2, BST, ST for increasing in cell capacitance (Background of the invention, col. 1, lines 25-31).

It would have been obvious to one having ordinary skill in the art at a the time the invention was made to have used the well-known high k material as suggested by

Hwang et al. in the combination teachings of Chi and Schugraf et al. for further increase in capacitance.

With respect to ZrO_2 and WO_3, since they are well-known to have high dielectric constant and commercial available, it would have been obvious to those skilled in the art to use them as a dielectric in capacitor structure.

Response to Arguments

Applicant's arguments filed 8/18/06 have been fully considered but they are not persuasive. Since Schugraf et al. teaches the use of HSG for increasing surface area of the capacitor electrode, it would have been obvious to those skilled in the art to use HSG polysilicon in Chi et al. capacitor construction.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan H. Nguyen whose telephone number is 571-272-1694. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan H. Nguyen
Primary Examiner
Art Unit 2813